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The evidence of the striations indicates a general movement of the ice from northeast to southwest. The Ecca or Beaufort series, consisting of fifteen hundred feet of sandstone and shale, occupies most of the surface, while the Stormberg series is found along the eastern border.

The whole area of Orangia has been intruded by a network of basic dikes and sills of nearly the same composition, and at a later date by the veinlike pipes and dikes of the diamond-bearing rock. This rock, which is known as Kimberlite, has a wide distribution in Orangia, filling both narrow fissures and vents or pipes. Its nature is as yet imperfectly known, some occurrences giving the impression of a consolidated igneous rock, others being apparently purely fragmental. The author thinks that the typical fissure Kimberlite is a magmatic intrusion, and that the pipes were originally filled, perhaps on more than one occasion, with a magma, which, except near the depth of origin, must have had a very low temperature for an igneous extrusion and which, after solidification, was smashed up by frequently repeated explosions.

E. R. L.

The Slates of Arkansas. By A. H. PURDUE, with a Bibliography of the Geology of Arkansas by J. C. BRANNER. Geological Survey of Arkansas, 1909. Pp. 164.

The part of this volume which is of greatest general interest is chap. iii, which deals with the geology of the slate area. This area includes the part of the Ouachita Mountains from Little Rock westward for about one hundred miles. The sedimentary rocks of known age are of Ordovician and Carboniferous (Pennsylvanian) age, with rocks of unknown age both above and below the Ordovician.

Above the rocks of known Ordovician age is a group of three formations of which the well-known Arkansas novaculite is the middle member. In a former publication of the Survey these were all classed as Ordovician, but the author finds no proof of this and thinks that they may be Ordovician, Silurian, or Carboniferous.

The region is one of intense folding, and thrust faulting is quite common.

E. R. L.

Geological Survey of Georgia. Bull. No. 23, "Mineral Resources." By S. W. McCALLIE, State Geologist. Pp. 208.

The introductory chapter on the geology of the state is brief and presents no new facts. The descriptions of the mineral deposits are arranged alphabetically, the general distribution, the mode of occur-

rence, the history of development and values being treated for each type of deposit. In most cases no attempt is made to inquire into the genesis of the deposits.

In a work of this nature whose value is chiefly statistical one would expect a general summary and table showing the relative importance and value of the various deposits, but none is found in this volume. Of the ores of the state, those of iron are by far the most important. In 1907 they were mined to the value of over \$800,000.

E. R. L.

The Mining Industry in North Carolina during 1907 with Special Report on the Mineral Waters. By JOSEPH HYDE PRATT. North Carolina Geological and Economic Survey, Economic Paper No. 15. Pp. 176.

The most important part of this paper is a report on the Gold Hill Copper District by F. B. Laney (pp. 20-55). This district is located in the south-central part of the state just west of the Yadkin River. The rocks are slates and igneous rocks of various kinds, and of different periods of intrusion. The ores are (1) auriferous pyrite and chalcopyrite in a quartz gangue and (2) slightly auriferous bornite and chalcocite in a quartz epidote gangue. No attempt is made to correlate the period or periods of ore deposition with a period of igneous activity or to determine the age of the ores.

The remainder of the paper is chiefly statistical.

E. R. L.

Paleontology of the Coalinga District, Fresno and Kings Counties, California. By RALPH ARNOLD (U.S. Geol. Surv. Bull. 396). Pp. 101 and plates 30.

The district forms a strip roughly fifty miles long by fifteen miles wide along the border between the Coast ranges and the San Joaquin valley. The eastern slope of the mountains is formed by a great thickness of strata dipping toward the valley, successively younger formations being exposed to the east. The rocks of the district range in age from the Franciscan formation, which is probably Jurassic, to rocks of recent age, with an unconformity at the base of almost every formation. A description of the formations with faunal lists is followed by description of forms from the Tejon formation (Eocene), the Vaqueros, the Jacalitos, and the Etchegoin formations (Miocene), and the Tulare formation (Freshwater Pliocene).

E. R. L.